Free Math Textbooks, Software, and Resources Worth Using

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44th Annual AMATYC Conference
Orlando, FL
Thursday November 15, 2018

AIM Open Textbook Initiative

A project of the **American Institute of Mathematics**:

Homepage: https://aimath.org/textbooks/

Approved textbooks: https://aimath.org/textbooks/approved-textbooks/

Aside: UTMOST initiative

https://utmost.aimath.org/

The Undergraduate Teaching in Mathematics with Open Software and Textbooks project, funded by the NSF, to investigate how students and faculty actually use textbooks in undergraduate mathematics courses, and to use that understanding to produce textbooks that are more effective in promoting student learning. The major components of the project involve education research, resource development, dissemination, and evaluation.

Common Types of Submissions

1. A textbook previously published commercially, for which author(s) now own copyright, e.g. *Calculus in Context* (https://aimath.org/textbooks/approved-textbooks/callahan/)
2. Textbook intentionally written to be open source e.g. *APEX Calculus* (https://aimath.org/textbooks/approved-textbooks/hartman-et-al/ or http://spot.pcc.edu/math/APEXCalculus/book-1.html) and *Active Calculus* (https://aimath.org/textbooks/approved-textbooks/boelkins/ or https://activecalculus.org/single/)

Example: Calculus textbook

Gregory Hartman: *APEX Calculus*

http://faculty.gvsu.edu/boelkinm/Home/AC/

Example: Calculus textbook

Matt Boelkins: *Active Calculus*

http://faculty.gvsu.edu/boelkinm/Home/AC/

Example: College algebra textbook

Modeling, Functions, and Graphs by Katherine Yoshiwara

https://yoshiwarabooks.org/mfg/

Or via AIM: https://aimath.org/textbooks/approved-textbooks/yoshiwara/

Example: Community college algebra textbook

ORCCA: Open Resources for Community College Algebra

http://spot.pcc.edu/math/orcca/section-set-notation-and-types-of-numbers.html

http://spot.pcc.edu/math/orcca/to-all.html

Example: Trig textbook

Trigonometry by Katherine Yoshiwara

https://yoshiwarabooks.org/trig/chap1.html

Or via AIM: https://aimath.org/textbooks/approved-textbooks/yoshiwara-trig/

What is PreTeXt?

A lightweight XML application for authors of research articles, textbooks and monographs.

The best of DocBook, LaTeX, and HTML.

Outputs: print, PDF, web, and soon, EPUB, Jupyter Notebooks

http://mathbook.pugetsound.edu/

Aside: What's involved with coding PreTeXt?

- Use a plain text editor for source file.
- Use GitHub to get and update Rob Beezer's tools
- Use a command line to process the source file
- Use PreTeXt google groups for support

Why check out PreTeXt?

The authors using PreTeXT use other other open resources!

http://mathbook.pugetsound.edu/examples/sample-article/html/section-interactive-authored.html

http://mathbook.pugetsound.edu/examples/sample-article/html/section-interactive-server.html

Aside

CalcPlot3D: https://calcplot3dblog.wordpress.com/

http://www.monroecc.edu/faculty/paulseeburger/calcnsf/CalcPlot3D/

Aside: Jupyter notebooks

I am almost entirely ignorant of Jupyter notebooks. “Jupyter” is evidently “a loose acronym meaning Julia, Python, and R. These programming languages were the first target languages of the Jupyter application, but nowadays, the notebook technology also supports many other languages.”
https://www.datacamp.com/community/tutorials/tutorial-jupyter-notebook

https://github.com/jupyter/jupyter/wiki/A-gallery-of-interesting-Jupyter-Notebooks

PreTeXt example: MyOpenMath exercises

http://mathbook.pugetsound.edu/examples/sample-article/html/section-myopenmath.html

Aside: Open source homework systems

WeBWorK http://webwork.maa.org/

(Edfinity: https://opencalculus.wordpress.com/2018/04/06/edfinity-a-textbook-agnostic-nsf-funded-nearly-free-online-homework-system/)

MyOpenMath https://www.myopenmath.com/

D. Brian Walton javascript http://educ.jmu.edu/~waltondb/webapp/Sampler.html

PreTeXt example: Class project

Geodesics on a flat torus
https://faculty.math.illinois.edu/~bradlow/torus-geodesics.html

Jayadev S. Athreya, Robert A. Beezer, Julia Borchardt, Steven B. Bradlow

Aside

Sage cell respository https://utmost.aimath.org/sage-cell-repository/

SageMathCell https://sagecell.sagemath.org/

Cocalc (formerly SageMathCloud) https://cocalc.com/

Curated courses https://curatedcourses.org/

Other sites for open math textbooks

A search will reveal many sites will lists of free textbooks recommended by organizations or reputable individuals.

https://openstax.org/subjects/math “OpenStax is a nonprofit educational initiative based at Rice University...We publish high-quality, peer-reviewed, openly licensed college textbooks that are absolutely free online and low cost in print...The knowledge in OpenStax CNX can be shared and built upon by all because it is reusable”

Thank you.

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